CLAIMS

1. A character-recognition pre-processing apparatus to detect whether a character string to be subjected to character recognition is in an upright state or in an inverted state, the apparatus comprising:

extraction means for extracting an image of a character string to be subjected to character recognition;

setting means for setting the smallest rectangle that surrounds the character string image extracted by the extraction means;

specifying means for specifying the position of each character within the smallest rectangle set by the setting means;

detection means for detecting, at each character position specified by the specifying means, the shortest distance between a character region and the lower edge of the smallest rectangle, and the shortest distance between the character region and the upper edge of the smallest rectangle; and

judgment means for judging whether the character string extracted by the extraction means is in an upright state or an inverted state, on the basis of variations in the two shortest distances detected by the detection means.

2. A character-recognition pre-processing apparatus according to claim 1, wherein the specifying means specifies the positions of characters through detection of spaces present between the characters.

3. A character-recognition pre-processing apparatus according to claim 1, wherein the specifying means estimates

31

a character width on the basis of a character height defined by the rectangle set by the setting means.

4. A character-recognition pre-processing apparatus according to any one of claims 1 to 3, wherein the judgement means judges the orientation of a character string in consideration of the fact that in some cases the orientation of a character string cannot be determined, depending on the attribute of characters contained in the character string.

5. A character-recognition pre-processing apparatus according to any one of claims 1 to 4 further comprising:
second judgment means which is operated when an image to be subjected to character recognition contains a plurality of character strings in order to judge the orientation of the image on the basis of information representing the orientations of the character strings judged by the judgement means.

6. A character-recognition pre-processing method to detect whether a character string to be subjected to character recognition is in an upright state or in an inverted state, the method comprising the steps of:
extracting an image of a character string to be subjected to character recognition;
setting the smallest rectangle that surrounds the character string image extracted;
specifying the position of each character within the smallest rectangle set in the step of setting;
detecting, at each character position specified, the shortest distance between a character region and the lower

edge of the smallest rectangle, and the shortest distance between the character region and the upper edge of the smallest rectangle; and

judging whether the character string extracted is in an upright state or an inverted state, on the basis of variations in the two shortest distances detected.

7. A program recording medium storing a program used to realize a character-recognition pre-processing apparatus to detect whether a character string to be subjected to character recognition is in an upright state or in an inverted state, wherein the program causes a computer to execute:

extracting an image of a character string to be subjected to character recognition;

setting processing for setting the smallest rectangle that surrounds the character string image extracted by the extraction;

specifying the position of each character within the smallest rectangle set by the setting;

detecting, at each character position specified by the specifying, the shortest distance between a character region and the lower edge of the smallest rectangle, and the shortest distance between the character region and the upper edge of the smallest rectangle; and

judging whether the character string extracted by the extraction is in an upright state or an inverted state, on the basis of variations in the two shortest distances detected by the detection.